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EXAMINER

MOUTTET, BLAISE L

ART UNIT PAPER NUMBER

2853

DATE MAILED: 08/06/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/735,166

Applicant(s)

MANTELL, DAVID A.

Examiner

Blaise L Mouttet

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 July 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2,5,9,10,14-21 and 24-34 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 14-16 is/are allowed.
- 6) ☒ Claim(s) 2,5,9,10,17-21 and 24-34 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 December 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 10, 24, 29 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Norum et al. US 5,923,344 in view of Couwenhoven et al. US 6,273,542.

Norum et al. discloses, regarding claim 24, a printhead signature correction method for a high resolution printer system, deployed at an end user site, the method comprising:

generating, at the time of manufacture of the printhead, a data file (22) of ink drop compensation values used to control operation of the printhead (figure 7, steps 31-35);

discharging ink droplets in a predetermined pattern from the high resolution printer system to form a test image on an image medium (figure 7, step 32);

determining positional differences (drop shifts) between droplet distance from a reference point for a first ink droplet and a second ink droplet (figure 7, step 32, column 5, lines 52-64);

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deriving updated ink droplet compensation values for the ink droplets based on the positional differences (figure 7, step 35);

adjusting, by the end user, ink droplet compensation values stored in the data file (figure 8, steps 42 and 43);

generating an updated data file (22) including the adjusted ink droplet compensation values (figure 8, step 45); and

regulating the printing operation by use of the compensation values stored in the updated data file (22) (column 6, lines 12-14).

Regarding claim 10, the method of Norum adjusts a direction of ink drop firing based on the compensation values (see figure 3).

Regarding claim 29, see column 3, lines 62-64.

Regarding claim 30, see column 5, lines 1-10.

Norum fails to disclose, regarding claim 24, combining the embodiments of figure 7 and figure 8 so that the end user adjusts the factory provided ink drop compensation values.

Couwenhoven et al. discloses updating initially determined compensation values in order to compensate for changes over the life of the print head (column 6, lines 48-57).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to update the compensation value determined in the method of figure 7 of Norum et al. performed at the factory using the method of figure 8 of Norum et al. performed by the end user given the suggestion of Couwenhoven et al.

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The motivation for doing so would have been to achieve consistent image quality over the life of the printhead as suggested by column 6, lines 48-57 of Couwenhoven et al.

2. Claims 2 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Norum et al. US 5,923,344 in view of Couwenhoven et al. US 6,273,542, as applied to claim 24, and further in view of Stanley et al. US 5,212,497.

Norum et al. in view of Couwenhoven et al. render obvious the combined limitations of claim 24 as explained above.

Norum et al. is concerned with aligning ink drops using shifting data (figures 3 and 4).

Norum et al. in view of Couwenhoven et al. fail to disclose that the determining comprises measuring velocities of the ink droplets discharged relative to one another, generating an ink droplet velocity profile from the measured differences and compensating for any differences in the velocities.

Stanley et al. discloses measuring ink droplet velocities of arrays of drop ejectors utilizing an optical detector (102) and having a user enter shifting data to compensate for deviation of drop velocities in the array (column 6, lines 33-62).

It would have been obvious for a person of ordinary skill in the art at the time of the invention to measure the velocities of the ink droplets in the determining step of Norum et al. in view of Couwenhoven et al. and generate an ink droplet velocity profile

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from the measured differences and correct for the measured differences as taught by Stanley et al.

The motivation for doing so would have been to provide a method to tune the print head so that all of the orifices eject ink droplets at velocities within an acceptable range to prevent printing defects as taught by column 2, lines 8-11 of Stanley et al.

3. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Norum et al. US 5,923,344 in view of Couwenhoven et al. US 6,273,542, as applied to claim 24, and further in view of Niikura et al. US 5,576,744.

Norum et al. in view of Couwenhoven et al. render obvious the combined limitations of claim 24 as explained above.

Norum et al. is concerned with aligning ink drops using shifting data (figures 3 and 4).

Norum et al. in view of Couwenhoven et al. fail to disclose that the step of regulating the printing comprises determining an air gap distance between the imaging medium and the printhead and controlling the ink discharge timing based on the air gap distance.

Niikura et al. teaches acquiring distance information between a printhead and a print medium and using this information to adjust ink discharge timing (i.e. shifting data) (column 6, lines 30-42).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to determine an air gap distance between the imaging medium and the

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printhead disclosed by Norum et al. in view of Couwenhoven et al. and use this information to control ink discharge as taught by Niikura et al.

The motivation for doing so would have been to prevent the formation of a faulty image due to a variable air gap (such as when printing on a curved drum) as taught by column 14, line 66-column 15, line 8 of Niikura et al.

4. Claims 25-28 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Norum et al. US 5,923,344 in view of Couwenhoven et al. US 6,273,542, as applied to claim 24, and further in view of in view of Gast et al. US 6,367,903.

Norum et al. in view of Couwenhoven et al. render obvious the combined limitations of claim 24 as explained above.

Norum et al. discloses, regarding claim 31, that the determination of the ink drop positions is accomplished by the use of human vision (column 2, lines 17-22, column 6, lines 3-14).

Norum et al. fails to disclose, regarding claims 25-28, grouping the ink ejectors into sets of grouped ink ejectors and adjusting the ejectors on a group by group basis to reduce drop placement errors to be less than 4 microns.

Gast et al. discloses grouping ink ejectors into sets of grouped ink ejectors (i.e. primitives P1-P14 as shown in figure 3) and adjusting the ejectors on a group by group basis to reduce drop placement errors to be less than a few microns (column 3, lines 35-46, column 6, lines 49-58).

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It would have been obvious to a person of ordinary skill in the art at the time of the invention to group the ejectors in the printhead of Norum et al. as taught by Gast et al. and align the ejector groups on a group by group basis as taught by Gast et al. to reduce drop placement errors to less than 4 microns as suggested by Gast et al.

The motivation for doing so would have been to prevent the skew and line waver printing defects illustrated in figure 8B as taught by column 3, lines 35-46 of Gast et al.

5. Claims 17, 19, 21 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Norum et al. US 5,923,344 in view of Stanley et al. US 5,212,497.

Norum et al. discloses, regarding claim 17, an image forming system comprising:
a printhead (as shown in figure 2);
a processor (12, figure 2) for controlling the printhead (column 3, lines 46-61);
a printhead facility (11, figure 2) coupled to the processor (12) for controlling the printhead based on differences between a parameter of a first ink droplet and a parameter of a second ink droplet measured after formation of an image on an imaging medium (column 3, lines 16-35, column 3, line 62 - column 4, line 9), the printhead facility (11) including:

a data file (22) including a plurality of compensation values used to control operation of the printhead (column 3, lines 27-35), and

a compensation adjustment mechanism configured to permit a user to update the compensation values stored in the data file (22) (column 6, lines 3-14).

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Regarding claims 19, the discharge is varied based on the differences between ink drop positions to align the print dots (column 3, line 62 - column 4, line 9).

Regarding claim 33, see column 6, lines 3-14.

Norum et al. is concerned with aligning ink drops using shifting data (figures 3 and 4).

Norum et al. fails to disclose, regarding claims 17 and 21, that the printhead facility measures velocities of the ink droplets discharged relative to one another, generating an ink droplet velocity profile from the measured differences and compensating for any differences in the velocities.

Stanley et al. discloses measuring ink droplet velocities of arrays of drop ejectors utilizing an optical detector (102) and having an end user enter shifting data to compensate for deviation of drop velocities in the array (column 6, lines 33-62).

It would have been obvious for a person of ordinary skill in the art at the time of the invention to have the printhead facility perform measurement the velocities of the ink droplets of Norum et al. discharged relative to one another and generate an ink droplet velocity profile from the measured differences and correct for the measured differences as taught by Stanley et al.

The motivation for doing so would have been to provide a system to tune the print head so that all of the orifices eject ink droplets at velocities within an acceptable range to prevent printing defects as taught by column 2, lines 8-11 of Stanley et al.

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6. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Norum et al. US 5,923,344 in view of Stanley et al. US 5,212,497, as applied to claim 17, and further in view of Niikura et al. US 5,576,744.

Norum et al. in view of Stanley et al. render obvious the combined limitations of claim 17 as explained above.

Norum et al. is concerned with aligning ink drops using shifting data (figures 3 and 4).

Norum et al. in view of Stanley et al. fail to disclose that the step of regulating the printing comprises determining an air gap distance between the imaging medium and the printhead and controlling the ink discharge timing based on the air gap distance.

Niikura et al. teaches acquiring distance information between a printhead and a print medium and using this information to adjust ink discharge timing (i.e. shift data) (column 6, lines 30-42).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to determine an air gap distance between the imaging medium and the printhead disclosed by Norum et al. in view of Stanley et al. and use this information to control ink discharge as taught by Niikura et al.

The motivation for doing so would have been to prevent the formation of a faulty image due to a variable air gap (such as when printing on a curved drum) as taught by column 14, line 66-column 15, line 8 of Niikura et al.

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7. Claims 32 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Norum et al. US 5,923,344 in view of Stanley et al. US 5,212,497, as applied to claim 17, and further in view of Gast et al. US 6,367,903.

Norum et al. in view of Stanley et al. render obvious the combined limitations of claim 17 as explained above.

Norum et al. fails to disclose, regarding claims 32 and 34, a group mechanism for grouping the ink ejectors into sets of grouped ink ejectors and adjusting the ejector groups by a same compensation value.

Gast et al. discloses grouping ink ejectors into sets of grouped ink ejectors (i.e. primitives P1-P14 as shown in figure 3) and adjusting the ejectors on a group by group basis to reduce drop placement errors (column 3, lines 35-46, column 6, lines 49-58).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to group the ejectors in the printhead of Norum et al. as taught by Gast et al. and align the ejector groups on a group by group basis as taught by Gast et al.

The motivation for doing so would have been to prevent the skew and line waver printing defects illustrated in figure 8B as taught by column 3, lines 35-46 of Gast et al.

Additional Prior Art

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Millet et al. US 5,128,691 discloses presenting **ink drops** in ascending order of droplet compensation values **to a sensor** (column 2, lines 62-column 3, line 3) and

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having a user adjust drop positions based on the dot detection (column 3, lines 10-20).

Miller et al. fails to disclose presenting **grouped ejectors to a user** in one of ascending and descending droplet compensation value ranking.

Allowable Subject Matter

9. Claims 14-16 are allowable.

The following is a statement of reasons for the indication of allowable subject matter:

The primary reason for the indication of the allowability of claims 14-16 is the inclusion therein, in combination as currently claimed, of the steps of presenting the grouped ejectors to a user in one of ascending and descending droplet compensation value ranking and updating, by the user, compensation values for a selected set of ink ejectors by a constant value based on the determined differences between the first set of ink droplets and the second set of ink droplets. This limitation is found in claims 14-16 and is neither disclosed nor taught by the prior art of record, alone or in combination.

The examiner notes that ranking grouped ejectors in and of itself was known to the prior art as part of processor operations to determine printing signal control (see for examples figures 4 and 5 of Couwenhoven et al.). It is the combination with user updating as currently claimed that is neither anticipated nor obvious over the prior art of record.

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The examiner recognizes that the allowable subject matter provides advantages to the art including, but not limited by, prioritization of user inspection to make it easier for a user to perform a correction for ink ejectors under various conditions.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Response to Arguments

10. Applicant's arguments filed July 18, 2003 have been fully considered.

The examiner agrees that the subject matter of amended claims 14-16 are patentable as noted above.

The applicant has argued, regarding claims 17-19, 21 and 32-34, that the applied rejections fail to render obvious the aspect of control of the print head based on differences in velocity of ejecting the ink drops, wherein the differences in velocity are determined by the end user based upon differences in measurements between parameters of the ink drops on the print medium.

The examiner disagrees.

As explained in the applied rejection Norum et al. '344 is concerned with generating dot shift data to correct for positional misalignment between ink drops on a print medium and providing user correction for such misalignment. Stanley et al. '497 is concerned with generating shift data to correct for velocity differences between ink

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drops inspected on a print medium and providing user correction for such differences.

Norum et al. would be motivated to incorporate the velocity correction taught by Stanley et al. because Stanley teaches that such velocity differences leads to positional misalignment with which Norum et al. is concerned.

The applicant has argued, regarding claim 24, 2, 5, 9, 10, 25-28 and 31, the amended feature of adjusting the factory compensation data with end user compensation data.

Although the examiner agrees that the embodiments of figures 7 and 8 of Norum are separate methods it would be obvious to combine the two method together in a single process given the teaching of Couwenhoven '542 as explained in the applied rejection.

The applicant has argued, regarding claim 28, that the teaching of Gast et al. regarding the error being minimized to less than a few microns (column 6, lines 55-58) is insufficient to render obvious applicants claimed minimization to less than 4 microns.

The examiner first notes that the range specified by Gast is the pre-correction error range indicating the error prior to correction. Clearly this is suggestive of a corrected range smaller than the cited range since the correction would minimize the error. Secondly the courts have noted that when applying rejections under 35 USC 103 the existence of an overlapping range in the prior art shifts the burden to the applicant to show that the claimed invention would not have been obvious. See for example *In re Peterson*, 65 USPQ2d 1379 (Fed. Cir. 2003). In the instant case the teaching of Gast et al. is seen to be for the same purposes as the teachings of applicant (i.e. ink drop

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positional compensation) and given the teachings of Gast et al. one of ordinary skill would recognize that the few microns cited by Gast et al. should be minimized to be as small as possible to avoid print defects. The applicant is referred to MPEP 2144.05 for a more thorough discussion of case law on this point.

Conclusion

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Blaise Mouttet whose telephone number is

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(703) 305-3007. The examiner can normally be reached on Monday-Friday from 8:30 a.m. to 5:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Meier, Art Unit 2853, can be reached at (703) 308-4896. The fax phone number for the organization where this application or proceeding is assigned is (703) 305-3432.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Blaise Mouttet July 31, 2003

BM 7/31/2003



Stephen D. Meier
Primary Examiner